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ABSTRACT

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Effects of Instructional Objectives on Relevant and Incidental Learning for Experienced and Inexperienced Possessors

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This paper was presented at the annual meeting of the American Educational Research Association, Toronto, March 28, 1978

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Effects of Instructional Objectives on Relevant and Incidental Learning for Experienced and Inexperienced Possessors:

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Abstract

In two identical experiments, undergraduate students were randomly assigned to study course-appropriate prose learning materials under one of four experimental conditions (two levels of experience with objectives by two levels of possession of objectives). Achievement on objectives-relevant test items was significantly higher for possessors regardless of experience. No significant difference due to experience was found for incidental learning scores. This lack of support for previously-reported findings showing decreased incidental learning for experienced possessors of objectives is attributed to differences in the relevance of the learning materials and the nature of the task conditions.

Instructional objectives have often been shown to enhance learning of instructional materials to which they specifically refer (Duchastel and Merrill, 1973). Several studies have also included investigation of the effects of possession of objectives on incidental learning (i.e., the learning of material unrelated to the objectives). Using college students in a regular class setting, Morse and Tillman (Reference Note 1) and Morse (Reference Note 2) found that subjects provided with partial sets of objectives, when compared to subjects possessing no objectives, scored higher on material covered by objectives but showed no significant difference on incidental learning. Rothkopf and Kaplan (1972) and Kaplan and Rothkopf (1974) found that possession of explicit objectives lead to increased performance on incidental-learning-related test items as well as on objectives-related items. Kaplan (1974) observed that incidental learning was significantly higher for subjects possessing objectives under some experimental conditions; in no experimental condition was a decrement in incidental learning found. (The latter three experiments utilized as subjects high school students who were paid volunteers.)

On the other hand, Duchastel and Brown (1974) found that possession of objectives was related to increased performance on objectives-relevant test items, but led to a decrement in performance on incidental learning items. The subjects is this laboratory study were college students who had had practical experience with instructional objectives and related criterion-reference testing. Duchastel and Brown inferred that these subjects, experienced in the use of objectives, used the objectives to focus attention on relevant material and thus paid less attention to the incidental learning material.

As Duchastel and Brown (1974) have pointed out, students who are inexperienced with respect to instructional objectives and how they relate to criterion-referenced post-testing may tend to distrust instructions which tell them to attend to instructional objectives (and hence to those portions of the learning materials to which the objectives refer). Lack of decrement in incidental learning might thus occur in inexperienced subjects. It is more difficult to explain why some treatment groups show higher incidental learning than the control groups. One might speculate, perhaps, that a partial list of objectives supplied to treatment subjects supplies them with clues as to the nature or frequency of appearance of information likely to be tested.

The studies conducted by Morse and Tillman (Reference Note 1) and Morse (Reference Note 2) dealt with subjects with no previous classroom experience in using objectives. Although it is not clear whether subjects in the Rothkopf and Kaplan (1972), Kaplan and Rophkopf (1974) and Kaplan (1974) studies had had classroom experience with objectives, it seems likely that they were lacking in such experience. Duchastel and Brown's (1974) subjects had had experience with objectives. While the differing results with respect to incidental learning obtained by Duchastel and Brown may have been related to the subjects' experience with objectives, a more definitive answer can be provided only by a design which includes both experienced and inexperienced subjects.

The present study examines relevant and incidental learning for subjects lacking experience with instructional objectives as compared with subjects having had such experience, within the confines of the regular college classroom, using instructional materials related to the course work. It was hypothesized that (1) possession of objectives

would enhance learning of objectives-relevant content for both inexperienced and experienced subjects, and (2) among possessors of objectives (but not among non-possessors), ~~and~~ inexperienced subjects would show a higher level of incidental learning than would experienced subjects.

Method

Subjects

A total of fifty-six students at a small commuter college participated in the study. Of these, only one had previously been enrolled in a college course in which performance was assessed by tests keyed to instructional objectives supplied to the students.

Twenty-eight of the students were enrolled in an undergraduate course in educational psychology taught by the senior author, which met daily for one quarter. Twenty-three of these students were female; five were male. Sixteen were majoring or minoring in Education while twelve were in health-related areas of study.

The replication sample consisted of twenty-eight additional students who were enrolled in an evening section (which met twice weekly) of the same course taught by the senior author during the subsequent quarter. Twenty students were female while eight were male. Eleven students were majoring or minoring in Education; seventeen were enrolled in health-related fields. The students in the replication sample were somewhat older than the initial sample of students, and nearly all of the former were employed in addition to attending school.

All students took the course as a required part of their educational programs.

Materials

The instructional materials consisted of a 2200-word passage discussing the effects of ability grouping upon student achievement and attitudes. Although this topic was not discussed at any other time during either quarter (and textbook assignments did not include any related discussion), the material was clearly related to the course content.

Ten instruction objectives were developed relating to the passage. Each objective could be classified at the "Knowledge" level of the cognitive taxonomy (Bloom, 1956). Each involved either the recall or recognition of information contained within the passage (e.g., "After studying this material, the student should be able to list two basic assumptions which underlie ability grouping."), The posttest consisted of ten items, with one item measuring each instructional objective. Four of the items called for the listing or stating of information; the remaining six items required students to select correct responses from multiple-choice format items. Each test item called for the same student behavior specified by its matching objectives.

Five of the objectives were randomly selected to be supplied to half the subjects. These objectives and matching test items thus dealt with relevant learning. The remaining objectives were not supplied to any subjects and performance on their related test items reflected incidental learning for those subjects possessing the first list of objectives.

Procedure

Prior to the first class meeting, subjects in the initial sample class were randomly assigned to either an "inexperienced" or experienced" condition. Subjects in the "inexperienced" condition were tested the second day of class, while in the "experienced" condition subjects were tested during the last week of the quarter (after more than nine weeks of experience taking criterion-referenced tests based on objectives supplied to the students).

Within each condition, subjects were randomly assigned to either a "partial objectives" or "no objectives" condition, though these assignments were not apparent to the subjects. Each subject was handed a packet consisting of the reading passage accompanied by a cover sheet which contained either a partial list of objectives and the statement that they would be tested only on these objectives, or a somewhat more expansive passage which told the students to read the materials in preparation for a test. Cover sheets for the two groups thus looked very similar, and subjects in the "partial objectives" and "no objectives" groups sat in the same classroom, read the same content material and took the test with no apparent awareness that their instructions for study had differed.

Subjects were told that the reading assignment was part of the course requirements, and that their scores on the test would comprise 10% of their final grades. They were told to study the materials in the manner they preferred, taking notes if they wished. Subjects were told that the group had approximately one hour to read the materials. Within that framework, subjects were allowed as much time as each needed to complete his study. (However, no subject required more than 35 minutes.) As each subject completed his study, he returned his copy of the learning

materials, obtained a copy of the test and took the test without the use of any notes he may have made during his study.

This design was then replicated in the subsequent quarter. Subjects in the inexperienced condition were examined during the first meeting of the class; subjects in the experienced condition were examined during the last regular class meeting. Again, no subject used more than 35 minutes to complete his study of the learning materials.

Both classes were told that the then-current shortage of mimeograph paper precluded having enough copies of the learning passage to allow the entire class to be tested at one time. (There was, in fact, a shortage of paper at that time, and students were aware of this.) At the time of the first testing in each class, the senior author explained that the second group (actually to become the experienced group) would be tested "just as soon as convenient", though in fact the second group was not tested until the end of the quarter.

In both classes, subjects in the inexperienced condition were requested not to discuss the reading assignment with other class members who were to be tested later. Since these were commuter students who lived at home and generally came on campus only for classes, their opportunities for interaction outside of class were rather restricted, and there was no indication that any sharing of information took place.

Results

Statistical Analysis

The experiment consisted of two independent replications (initial and replication samples) of the 2 x 2 factorial design (Experience by Possession). Due to unequal cell frequencies in the replication sample, the "Classic experimental" option for the SPSS analysis of variance program (Nie et al, 1975) was selected as the appropriate approach. When

the cell frequencies are equal, this is identical to the orthogonal solution; when they are unequal, it establishes orthogonality between the additive, interactive and error components by imposing a hierarchy of components. Additive main effects are then partitioned by adjusting each main effect for the value of the other(s).

Findings

Hypothesis One specified that the possession of objectives would enhance relevant learning, regardless of experience level. Since this hypothesis represents a "positive control" required to validate the experiment, it was tested in each of the two samples separately, and was confirmed in each (initial sample, $p < .0005$, 1-tail; replication sample, $p < .0015$, 1-tail). (See Table 1)

Hypothesis Two represents an attempt to reconcile what appeared to be conflicting results in previous studies by postulating a significant Experience X Possession interaction effect upon incidental learning. To maximize power, the two samples were combined. A factor for groups (considered to be random) was included in the design to guard against the possibility that the two samples differed with respect to incidental learning. As indicated in Table 2, neither the main effect for groups nor any of the interactions involving groups approached significance. The hypothesized interaction between experience and possession was negligible ($F=.206$) and non-significant. Treatment effects were almost completely accounted for by the main effects of experience and possession, neither of which attained significance.

Discussion

The results supported the first hypothesis that possession of objective would enhance learning of objective-relevant content for both inexperienced and experienced subjects. These results support previous

findings. The slightly higher performances for inexperienced subjects may be a function of differential motivational effects of the grading system at the times the subjects were tested. Perhaps one works harder on an assignment accounting for ten percent of one's grade at the beginning of a course. At that time, grade aspirations and expectations are high, whereas, at the end of a course, the bulk of other coursework has been submitted and graded, and one's final grade is thus largely determined.

The finding that experienced possessors did not show significantly lower performance on incidental learning-related test items conflicted with research reported by Duchastel and Brown (1974). In that study, college students who were experienced with behavioral objectives were enrolled in a communications course. These subjects volunteered to participate in a laboratory experiment, for which they received course credit, in which they read a 2400-word passage on mushrooms. In the present studies, subjects enrolled in a course in educational psychology studied, in class, a 2200-word article on ability grouping. Thus, the characteristics of the task condition in the present studies differed from those in the earlier study in which a decrement in incidental learning was observed. Instead of using learning material unrelated to the course content, the present study used material which could be viewed not only as relevant to the course, but, in the instance of those subjects planning to teach, to future careers as well. It may be that when learning materials appear to the student to be relevant, the focusing effects of objectives suggested by Duchastel and Brown are less operative.

Further, the present study was conducted as part of regular course requirements rather than as a laboratory experiment. Perhaps, within the regular academic setting, certain motivational variables are operative

which are less likely to be tapped in laboratory situations. Thus, it may be that under such conditions, and using such materials, even experienced users of objectives (when compared to non-possessors) show little decrement on incidental learning.

An additional possible explanation for the lack of significant decrement in incidental learning in the present study may involve the number of objectives supplied to the possessors and the length of time available for study. Possessors in Duchastel and Brown's (1974) study received twelve objectives, a 2400-word passage, and were allowed a maximum of 30 minutes for study. Possessors in the present study were provided with five objectives, a 2200-word passage, and were told they had maximum of one hour to study (though none used more than 35 minutes). It seems likely that whatever focusing effects objectives may have would be heightened when the list of materials to be learned is long while the time for learning is short.

The present study produced no significant differences in incidental learning between experienced and inexperienced possessors. However, it is clear that future research should be conducted to further explore the relationship between possession, the nature of the learning task, and the conditions under which learning occurs.

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Table 1

Analysis of Variance Tables for Hypothesis One
(Effect of Experience and Possession on Relevant Learning)

	Source	SS	df	MS	F	P
Initial Sample	Experience	2.009	1	2.009	2.87	n.s.
	Possession	29.009	1	29.009	41.48	<.0005*
	E x P	1.509	1	1.509	2.16	n.s.
	Residual	16.786	24	.699		
		49.313	27			

	Source	SS	df	MS	F	P
Replication Sample	Experience	.040	1	.040	.037	n.s
	Possession	11.967	1	11.967	11.089	<.0015*
	E x P	1.146	1	1.146	1.06	n.s.
	Residual	25.900	24	1.079		
		39.053	27			

*one tail.

Table 2
Analysis of Variance Table for Hypothesis Two
(Effect of Experience x Possession Interaction on Incidental Learning: Groups treated as random factor)

Source	SS	df	MS	Error Term	F	P
Experience	2.113	1	2.113	EG	8.452	ns
Possession	2.195	1	2.195	PG	2.667	ns
Groups (Random)	.007	1	.007	Residual	.008	ns
E x P	.013	1	.013	EPG	.206	ns
E x G	.250	1	.250	Residual	.276	ns
P x G	.823	1	.823	Residual	.907	ns
E x P x G	.063	1	.063	Residual	.069	ns
Residual	43.544	48	.907			
TOTAL	49.008	55				